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FOREST RESEARCH NEWS

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SOUTHERN & SOUTHEASTERN FOREST EXPERIMENT STATIONS, USDA FOREST SERVICE

How To Grow Saw Logs On a Pulpwood Rotation

A forest landowner can raise a crop of loblolly pine pulpwood in 30 years or so if he has good land in the Coastal Plain. On some soils he can grow about 2 cords of pulpwood per acre annually if he harvests about one-third of the growth in frequent, moderate thinnings. But if he prefers, he can grow saw logs in the same time—about 500 board feet per acre annually in trees 14 to 16 inches in diameter.

To get saw logs, he must thin heavily, control understory hardwoods, and prune a few crop trees. He must also sacrifice some of the early pulpwood thin-

nings. This recipe for sudden saw logs is from a study in southern Arkansas.

In the study, loblolly pine was planted at a spacing of 6 by 6 feet and thinned at age 12 years to 100 crop trees per acre. Pulpwood removed in this drastic thinning brought a handsome cash return. More importantly, it left the crop trees with plenty of room to grow.

The trees were also free to develop long crowns and massive lower limbs, and for that reason pruning became necessary. And, with about 80 percent

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Heavy thinning, pruning to 33 feet, and control of understory created this archord-like stand. The trees are much larger and smoother than those in the conventionally managed portion of the same 26-year-old plantation in the background.



Primitiveness Recommended for Appalachian Trail

Each year thousands of hikers don shoulder packs and head for the back-country, many choosing the Appalachian Trail which winds for 2,000 miles through the mountains from Maine to Georgia. What do hikers of this most famous trail in the United States expect to find along the way? To answer this question, the Forest Service, which cooperatively maintains 680 miles of this trail within southern national forests, surveyed users in Virginia, North Carolina, Tennessee, and Georgia.

Many of the opinions expressed were related to past hiking experience. Seasoned hikers preferred natural footways with a minimum of stone steps and bypasses at steep ascents, whereas those with less experience favored more trail development and markers. Regardless of past experience, most hikers preferred to travel in small parties. They favored small shelters with few facilities except fireplaces. All preferred views of mountains and countryside and disliked seeing roads, signs of timber harvesting, and industrial valleys. In areas with natural views, the cutting of overlooks was frowned upon, but there was more approval of them in heavily forested areas.

Judith Buckley Murray, a graduate student at the University of



The Forest Service maintains 680 miles of the Appalachian Trail within southern National Forests.

Tennessee, made the survey in cooperation with the Appalachian Trail Conference. Results of her work were recently published by the Southeastern Forest Experiment Station.

Historically, the Appalachian Trail has been a simple footpath through the woods, with mountainous ascents varying from gentle grades and switchbacks to steep, rocky paths. The sur-

vey indicates that hikers value the opportunities it provides for primitive camping and escape from an urban to a natural environment. Mrs. Murray recommends that Forest Service managers preserve these unique characteristics of the Appalachian Trail and that more developed trails and campsites be built elsewhere for those who prefer them.

NEW WOOD HANDBOOK

The *Wood Handbook*, that bible for designers and builders of wooden structures, is available in a new edition.

The last edition dated from 1955 and has been out of print. The new version, subtitled "wood as an engineering material," has been expanded and updated throughout. Among the additions are data on mechanical properties of commercially important woods imported into the U. S. from Canada and tropical regions. The chapters on lumber and stress grades have been modernized to take ac-

count—among other things—of the new lumber sizes.

This volume, like those preceding it, was prepared by the USDA Forest Products Laboratory at Madison, Wisconsin. It retains its historic designation as Agriculture Handbook 72, but the format has been enlarged. The 22 chapters aggregate more than 400 pages. Hardbound copies are available for \$7.85 from the Government Printing Office Bookstore, Room 100, Federal Building, 275 Peachtree Street NE, Atlanta, Ga. 30303.

Mechanized Thinning Evaluated

Faced with labor shortages and rising wages, foresters are investigating mechanized systems for thinning the thousands of acres of southern pine plantations which each year reach the preferred age for a first commercial cut. Three such systems—shortwood, long-log, and whole-tree—were evaluated in a recent study in north Florida.

During the study, entire rows were removed from slash pine plantations growing in sandy soil on flat terrain. From machine times and tree measurements, Walter C. Anderson and James E. Granskog, economists with the Southern Forest Experiment Station, developed equations to predict productivity of each harvester and its skidder. Output and costs were calculated for various stand ages, spacings, and site indices.

Results are applicable to slash pine plantations on similar sites, but the researchers caution that productivity of the harvesters will vary with tree species. However, the procedures outlined in the report can guide those who want to assess a particular harvester or to determine if a certain tract can be economically thinned.

"Mechanized Row-Thinning Systems in Slash Pine Plantations," Research Paper SO-102, is available from the Southern Forest Experiment Station.

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Citizen Participation--A Challenge

Should citizen groups participate in public land management decisions? Definitely yes, say Lloyd Irland and J. Ross Vincent, coauthors of a recent article in *Journal of Range Management*.

Managers of public lands are beset by conflicts between commodity and noncommodity users. Should an area be designated for skiing or mining? For a wildlife refuge or timber production? For grazing or wilderness area? Citizen participation in such decisions is a challenge to public land managers, now required by the National Environmental Protection Act to seek out and analyze all viewpoints on a given proposal.

Irland and Vincent think land managers need increased citizen participation to redress an imbalance between commercial users and citizen groups. Environmentalists and others active in public affairs have long complained of difficulties in gaining information and exercising influence in decisions. Groups interested in obtaining commodities such as minerals, timber, or water maintain full-time lobbyists to look after their interests. In contrast, persons interested in wilderness, wildlife, and other values are widely dispersed and lack time and resources to devote to public land controversies.

This disparity leads to tactics such as ad hoc lawsuits and letterwriting campaigns as substitutes for direct legislative lobbying. Such tactics have sometimes been highly successful.

Given the rise of activist citizen groups concerned with public land management, and in-

creased judicial willingness to grant them standing to sue and review agency decisions, land managers must seek out and facilitate participation of citizens groups. Merely listening to public views at hearings is not enough.

Increased participation is not only inevitable but desirable, Irland and Vincent state. Potential gains include more knowledgeable citizen group leaders, active allies for support of non-

commodity programs, reduction or elimination of legal challenges on procedural rather than substantive issues, and improved means of assessing public attitudes. Additionally, participation will facilitate agency compliance with the National Environmental Protection Act. Copies of the article are available on request from the Southern Forest Experiment Station, 701 Loyola Avenue, New Orleans, Louisiana 70113.



Two land managers talking it over
—a farmer and a forest ranger.



Fairie Lyn Carter of Gulfport, Mississippi, checks wood blocks of various species for evidence of termite damage. The U.S. Forest Service chemist is trying to isolate and identify the chemical extractives that make some woods resistant to termite attack.

To Eat Or Not To Eat?

Termite Dilemma

If you think one juicy board tastes as good as another to a hungry termite, you're wrong. Termites will starve rather than eat some woods, and they die when exposed to others. U.S. Forest Service scientists are trying to find out why. With this information they hope to develop new, ecologically sound ways of protecting wood from the voracious insect which each year causes about \$500 million damage.

Chemist Fairie Lyn Carter explains that the resistance of certain woods results primarily from chemical extractives which are distasteful, repellent, or toxic to termites. At the Southern Forest Experiment Station laboratory in Gulfport, Mississippi, she is working to determine which woods are resistant and to isolate and identify the extractives responsible. If these extractives can then be made synthetically, they might be used to protect susceptible woods.

In the past 2 years Carter has tested over 130 woods for resistance or susceptibility to termite attack and has developed a procedure for removing many of the toxic extractives. Extraction is no easy task, for wood extractives are extraordinarily diverse compounds. No one solvent and no one sequence of extractions will remove all toxic materials from all woods. However, Carter's technique of successive extractions with the solvents pentane, acetone, and acetone/hexane/water has yielded good results with many woods. The toxic extracts she has obtained are now being fractionated to identify the toxic components.

Because little research has been done on termite-detrimental extracts from native American woods, Carter first tested 11 commercially important conifers indigenous to temperate North America. Western larch, Engelmann spruce, Douglas-fir, western hemlock, and subalpine fir

proved highly susceptible to termite attack. Termites could not survive on heartwood samples of Port-Orford-cedar, western red-cedar, ponderosa pine, redwood, baldcypress, and eastern red-cedar. Toxic extracts were obtained from most of the resistant woods, and Carter is now attempting to determine their chemical composition. In addition, the researcher is looking closely at the southern pines because these species make up over one-fourth of the timber supply in the States east of the Rockies.

Carter and entomologist Ray Beal also screened 100 tropical hardwoods from Central America for resistance to the native



To test the susceptibility of woods to attack, termites are placed in small plastic containers with a block of test wood and sterile, moistened sand. After 8 weeks, termite survival and damage to the block are checked.

eastern subterranean termite and the Formosan termite, which has been introduced into this country. Twenty-three woods which showed little or no termite damage after 8 weeks were extracted. Toxic materials obtained from 14 of the woods are being examined further. The researchers point out that many of the resistant tropical woods are not available in sufficient quantities for use in general construction but that their extractive components, or synthesized chemicals with similar structures, may prove of economic value.

Another study revealed differences in termite response to decayed and sound wood. Survival tended to be higher on sawdust prepared from decayed wood than on sawdust from sound wood. More immature termites developed into soldiers on sound wood than on decayed; and more developed into neotenic, or reproductives, on decayed wood than on sound.

Ultimately Carter's research may produce a new method of termite control. Currently buildings are protected from termites by treating the underlying soil with chemicals. But these chemicals are being reviewed by the Environmental Protection Agency, and it seems likely that their use will be severely restricted and perhaps even banned eventually. Thus, the search for a new termiticide is vital.

Carter's work on wood extractives is attracting worldwide attention, and she has been invited to address the International Symposium on Organisms and Wood in Berlin this May. The meeting will draw scientists from throughout Europe, Asia, and America and will focus on the problems of biodeterioration of wood and wood products.

NEGATIVE TIMBER TRENDS IN NORTHERN COASTAL PLAIN OF NORTH CAROLINA

Forest Survey statistics just released for a 23-county area in North Carolina's Northern Coastal Plain show that removals of pine and other softwood timber exceeded growth by 19 percent in 1973. This is only one of several significant findings of the USDA Forest Service's fourth survey of this important timber area.

Between 1963 and 1974, commercial forest area decreased by more than 3 percent, and area occupied by sawtimber stands dropped by 37 percent. Areas of forest land owned by farmers and forest industries declined, while other private holdings increased.

Total volume of growing-stock timber inched up by 2 percent over the past 11 years, but most of this modest gain was in small hardwood. A 29-percent increase in annual growth failed to keep pace with a 53-percent surge in annual timber removals. In 1973, slightly over half of the growth was hardwood, yet 60

percent of the removals were pine and other softwoods. All together, softwood removals exceeded net growth in 15 of the 23 counties.

Favorable findings included a substantial buildup in the stocking of small trees and a reduction in the annual volume loss to mortality. Most of the stocking increase was hardwood, however, and over half of the mortality in 1973 was pine and other softwoods.

The survey was conducted by the Forest Service with cooperation from the North Carolina Forest Service and other public agencies, forest industry, and private landowners. Detailed information is available in a report titled "Forest Statistics for the Northern Coastal Plain of North Carolina, 1974." Copies can be obtained from the Southeastern Forest Experiment Station, P. O. Box 2570, Asheville, North Carolina 28802. Authors are Richard L. Welch and Herbert A. Knight.

Pine timber has been heavily utilized in the Coastal Plain of North Carolina.



Reducing Weevil Damage On Young Pines

Up to 90 percent of the young pines planted on freshly cut areas in the Southeast may be killed by tiny insects one seldom sees. These insects, called pales and pitch-eating weevils, hide in the soil by day and emerge at night to feed on pine seedlings, often girdling the stems completely. Because the weevils are initially attracted into pine stands by freshly cut stumps in which they breed, damage can be reduced by scheduling harvests well in advance of planting. The trick is knowing when to cut in particular geographic areas.

Weevil damage will be increased if pines are cut after June in the Piedmont or Coastal Plain or any time during the summer or fall in the Southern Appalachians, according to Charles F. Speers of the Southeastern Forest Experiment Station. In the Southeast, pines are usually planted between December and March, and sufficient time must

elapse after harvesting for weevils to complete their life cycle and emerge as adults. Otherwise, the weevil larvae will remain in the stumps all winter, complete their development in spring, and emerge to feed on newly planted seedlings.

Speers determined proper timing of timber harvests by experiments in the three regions of the Southeast. He buried pine bolts containing fresh eggs at monthly intervals from May through August. The time required for adults to emerge varied from 3 to 14 months, depending on location and the date of egg laying. In the Piedmont and Coastal Plain, all weevils from eggs deposited in May emerged before the December planting season began, but part of the broods from eggs deposited later emerged the following year. In the Southern Appalachians, all broods emerged the following year, regardless of when the eggs were deposited.

Details of the study appear in Research Note SE-207, available from the Southeastern Forest Experiment Station, P. O. Box 2570, Asheville, North Carolina 28802.

Abies to Ziziphus

Trees lead a brisk sex life but, as a forester once remarked, "Most people don't pay any attention, because it all goes on quietly 20 or 30 feet overhead."

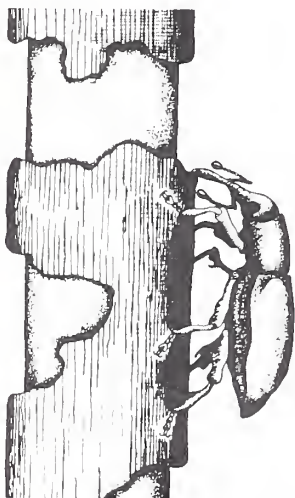
Nevertheless some people—predominantly researchers of the Forest Service—have indeed been paying attention, and the result is a tremendous new book: *Seeds of Woody Plants in the United States*. It starts off sedately enough, by stating that "Seed is the principal means for perpetuation of trees and many woody species from one generation to the next." When it ends, on page 883, it has summarized all that is known about the seeds of 188 genera of the most important wildland plants in the country. From *Abies* (spruce), to *Ziziphus*, or jujube.

The chief coordinator, C. S. Schopmeyer, states that it is written for everyone who works with tree seeds. That includes forest and range specialists, urban foresters, horticulturists, research scientists, seed collectors and dealers, nurserymen, forestry students, and perhaps even backyard gardeners.

There isn't anything like it for any comparable area of the globe. A predecessor on a more limited scale appeared in 1948 and has long been out of print.

The first part of the new book consists of 166 pages divided into seven chapters. Subjects include seed biology, principles of genetic improvement, pollen handling, harvesting and storage, testing, and marketing controls. Each chapter is by one or more nationally known experts.

In part 2, large tables and concise texts supply detailed information on about 800 species.



Pales and pitch-eating weevils often completely girdle the stems of pine seedlings.

House Care Booklet Reissued

"Finding and keeping a healthy house," an illustrated booklet first issued in 1973 and out of print for some time, is now available again. This homeowner's guide to prevention of damage by insects and decay has been reprinted as USDA Miscellaneous Publication 1284. Limited numbers of copies are available on request to the Southern Forest Experiment Station, 701 Loyola Avenue, New Orleans, Louisiana 70113.

Readers can find dates of flowering and fruiting, size and weight of seeds, and methods of collection, extraction, storage, and germination. The compilers searched every known source of information, ferreting out unpublished data and getting reviews from cooperators in universities, seed laboratories, seed companies, State forestry organizations, and other agencies in the U. S. Department of Agriculture.

Most of the plants are native, but introduced species have been included if they are grown on forest or range lands.

Drawings and photos are used freely. An inset of 16 pages pictures a few of the many fruits for which color is a criterion of ripeness. Format, binding (hard), editing, proofing, and printing complement the text to produce a book in the best tradition of Forest Service publishing.

The volume, designated Agriculture Handbook 450, is available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402. Price is \$13.60, cash or check.

Guide to Training Aids On Wood Protection

A guide to training material on wood products protection has been assembled by the Southern Forest Experiment Station. It lists educational courses, literature, and audio-visual material on wood-destroying insects and diseases. Brief descriptions of the training aids are given, along with cost and source of supply. The authors are Terry L. Amburgey, Lonnie H. Williams, and Raymond H. Beal. Copies are available from the Southern Forest Experiment Station. Ask for General Technical Report SO-5.

Logging Residues In Southeast

During the past 10 years, loggers in the Southeastern United States have greatly reduced the volume of unused wood left in the forest. A study by the Forest Survey Unit of the Southeastern Forest Experiment Station, however, indicates that there is still plenty of room for improvement.

Between 1966 and 1972, almost 300 logging operations in Florida, Georgia, and South Carolina were observed, and volumes of residues were recorded for each. Some improvements were observed. Tree-length and multiple-product logging, for example, left 35 percent less residue from growing-stock trees than did traditional single-product logging.

Nevertheless, the volume of logging residues generated each year in the three States was a-



Large amounts of wood are often left in the forest after logging. Much of this material is usable.

bout 560 million cubic feet. That is approximately equal to the volume of pulpwood produced in Georgia each year.

The study is described by Richard L. Welch in the *FOREST PRODUCTS JOURNAL* for October 1974. Reprints are available from the Southeastern Forest Experiment Station, P. O. Box 2570, Asheville, North Carolina 28802.

Structural Pest Control Laws Discussed

Many a homeowner doesn't know that his house has construction faults inviting attack by wood-destroying organisms. Nor does he know how to recognize early signs of attack and what to do about them.

He reads that pest control protection influences the lives of millions of Americans and represents a multimillion dollar business. But what does that mean to the man who discovers tiny holes in his new hardwood flooring? Or what about the veteran whose furniture brought home from Thailand shows signs of insect infestation?

These are just two sample questions from a great many received by Forest Service scientists at Gulfport, Mississippi, where the Southern Forest Experiment Station has a laboratory for research on wood products insects and decay. The scientists believe that if known information were properly applied most loss could be avoided.

The problem is how to get it applied. Part of the solution is to tell as many people as possible how to avoid damage. Architects and builders, for example, could do more than at present



Some pest control treatments are costly. How can a homeowner learn if they are justified?

to design and construct houses that minimize the likelihood of attack. And building owners themselves are often careless in their use of wood.

Another part of the answer is in the service furnished by the pest-control industry. Consumers normally rely on the professional pest-control operator both for prevention and for help in time of trouble. (For one thing, Federal law will soon require that insecticides for control of wood-destroying organisms be sold only to certified operators.)

Well, then, how can consumers know that they are getting reliable service when they sign a contract for control of wood-destroying organisms? Do States have regulations governing firms that write such contracts? Only 18 of them do. Usually the laws are administered by the State department of agriculture.

Are the regulations uniform? Not at all. Do consumers receive benefits from them? To some extent, yes. A number of States provide free inspections of buildings upon homeowner complaint and give advice about controls.

More consumers could benefit if they knew services of the regulatory agency were available.

What should State regulations cover? What services should pest control customers receive? What should licensing requirements include? With the passage of the Federal Environmental Pesticide Control Act, many States will enact legislation or revise existing laws.

Extensive inquiry by the researchers revealed that nearly everyone involved agrees that some minimum standards or procedures are desirable to insure quality service and consumer protection. But there is disagreement on how to achieve the goals. Two solutions are typically proposed: self-policing through industry-imposed standards or regulation by State or Federal authorities.

The researchers recommend considering the desirability of developing a model law through cooperation among the pest control industry, the National Pest Control Association, State regulatory personnel, the Environmental Protection Agency, Fed-

eral Housing Authority, Veterans' Administration, and other interested groups.

Otherwise the researchers take no position. Their purpose is to present information, and let the reader draw his own conclusions. To this end they have compiled a digest of the pest-control regulations in the various States, and have provided a short text explaining why such regulations were formulated. The report is Research Paper SO-93. The authors are Richard V. Smythe and Lonnie H. Williams. For a copy, write to the Southern Forest Experiment Station.

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of the pine canopy gone, invading hardwoods also had plenty of room. That is why the understorey had to be controlled.

At age 24, a saw-log thinning removed 20 trees containing a thousand board feet per acre (Int. $\frac{1}{4}$ -inch). At age 27 the standing sawtimber volume was 12,000 board feet to an 8-inch top inside bark.

Width of annual rings was more uniform in the saw log trees than in stands managed conventionally by thinning moderately and not pruning or controlling hardwoods. Specific gravity of the wood was not affected.

Details about this system and two other methods for accelerating diameter growth of crop trees are given by James D. Burton and Eugene Shoulders in the *Journal of Forestry* for October 1974. Reprints are available from the Southern Forest Experiment Station, 701 Loyola Avenue, New Orleans, La. 70113. A less technical description is given by Burton in the *Southern Lumberman*, December 15, 1974.